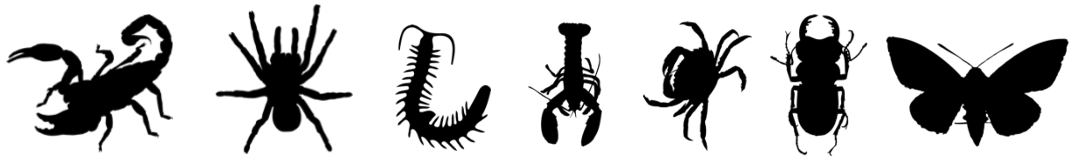
The Arthropods



General Characteristics (check all that are appropriate):

Type of Symmetry	☐ Asymmetric ☐ Radial ☐ Bilateral
Tissue Clade	☐ Parazoa ☐ Eumetazoa
Number of Layers of Embryonic Tissue / Blastula Condition	☐ 2 (Diploblast) ☐ 3 (Triploblast) ☐ Not applicable
Body Cavity Type	☐ Coelomate ☐ Acoelomate ☐ Pseudocoelomate ☐ Not applicable
Embryonic Development Pattern	☐ Protostome ☐ Deuterostome ☐ Not applicable

Taxonomy / Classification:

Domain	
Kingdom	
Phylum	
Subphyla (4)	
Orders (32+)	

Basic Sketch:

General Characteristics:

1.

2.

3.

4.

5.

Notes About Anatomy:

1.

2.

3.

4.

5.

Characteristics LIKE other animals:

1.

2.

3.

4.

5.

Characteristics DIFFERENT FROM other animals:

1.

2.

3.

4.

5.

Other Facts:

Subphylum Chelicerata

Unique anatomical structure(s):

Examples:

Notes:


Subphylum Crustacea

Unique anatomical structure(s):

Examples:

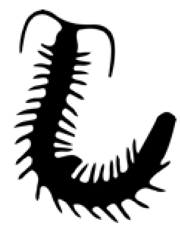
Notes:


Subphylum Myriapoda

Unique anatomical structure(s):

Examples:

Notes:

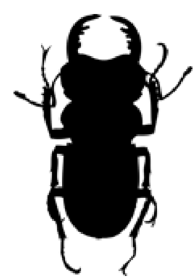


Subphylum Hexapoda

Unique anatomical structure(s):

Examples:

Notes:



Largest orders (6 of 32+):

1.
2.
3.
4.
5.
6.

The Hexapods

- 32 or more orders exist!
- Most numerous group of species… Very successful at evolution

Class: **Arachnida (not a hexapod!)**

Name translates as:

Examples:

Characteristics:

Order: **Homoptera**

Name translates as:

Examples:

Characteristics:

Order: **Coleoptera**

Name translates as:

Examples:

Characteristics:

Order: **Hymenoptera**

Name translates as:

Examples:

Characteristics:

Order: **Diptera**

Name translates as:

Examples:

Characteristics:

Order: **Lepidoptera**

Name translates as:

Examples:

Characteristics:

Order: **Ephemeroptera**

Name translates as:

Examples:

Characteristics:

Order: **Odonata**

Name translates as:

Examples:

Characteristics:

Order: **Hemiptera**

Name translates as:

Examples:

Characteristics:

Order: **Orthoptera**

Name translates as:

Examples:

Characteristics:

BIOL 211

Claim – Evidence – Reasoning (CER) Framework

> "At the end of the day, it's just raw curiosity.
> I think almost everybody that gets seriously into science is driven by curiosity."
> ~Kerry Emmanuel, American emeritus professor of meteorology at MIT~

Curiosity—the desire to explain how the world works—drives the questions we ask and the investigations we conduct. The ***Claim-Evidence-Reasoning*** framework provides a scaffold for thinking about science and explaining phenomena. This framework helps connect experiences to content knowledge (and therefore helps answer questions) in three steps:

- **C** = Make a **claim**: A statement that answers the original question.
- **E** = Support your claim with **evidence**: the quantitative data that supports your claim. Evidence should be both appropriate and sufficient to support the claim.
- **R** = Provide **reasons**: this is the explanation, the "because". Reasons tell why a certain claim is what it is. Reasons are the scientific principles that substantiate your evidence and explain why something occurred.

By using the CER framework in science, you practice analytical and critical thinking. Analytical thinkers are capable of deducing cause and effect, analyzing data and interpreting results, evaluating reasonability, and synthesizing information. Critical thinkers use objective analysis and evaluation of a set of data or a situation in order to form a judgment.

In applying the CER framework, you must articulate a coherent explanation about your claim. Here are some do's and don'ts to get you started:

Claim: A statement of understanding about a phenomenon or about the results of an investigation. • A one-sentence answer to the question you investigated • It answers, what can you conclude? • It should not start with yes or no. • It should describe the relationship between dependent and independent variables.
Evidence: Scientific data used to support the claim. • Evidence must be sufficient: Use enough evidence to support the claim. • Evidence must be appropriate: Use data that support your claim. Leave out information that doesn't support the claim. • Can be qualitative, quantitative, or a combination.
Reasoning: Justification that ties together the claim and the evidence. • Shows *how* or *why* the data count as evidence to support the claim. • Provides the justification for why this evidence is important to this claim. • Includes one or more scientific principles that are important to the claim and evidence.

Strong answers to questions on assessments should include all three components.
The justification piece can be hard!

Group Members' Names: ___________________________________

Claim, Evidence, and Reasoning: <u>Hexapod Identification</u>

Hexapod Unknown Number _______
Make observations about typical characteristics of this hexapod that you might use to help you identify it to at least order level:
Make a *claim* based on the above data set: To what order do you believe this unknown hexapod belongs?
What *evidence* from your observations above support your claim?
What *reasons* explain why your evidence supports your claim?
Put it all together: Write a full paragraph where you state your ***claim***, cite your ***evidence*** from the data table, and provide ***reasoning*** to explain why the evidence supports your claim.
Annotate your paragraph: Highlight and label your claim with a "C", each key piece of evidence with an "E", and each reason with an "R".

Oberlin Arboretum – Ecosystem Types

What types of questions could you ask about insect biodiversity in relation to ecosystem type?

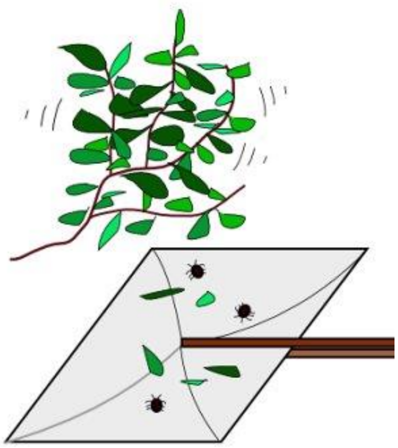
Experimental Design: What's the difference between a NULL hypothesis and an ALTERNATIVE hypothesis?

Types of Sampling Traps Available

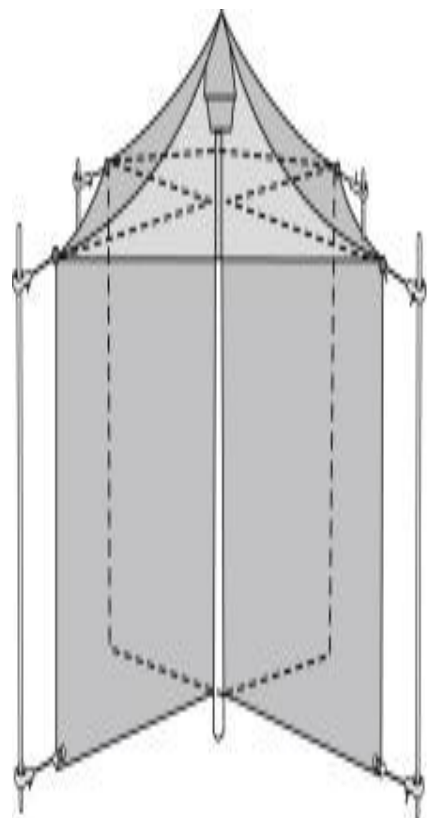
Sweep net

Berlese funnel

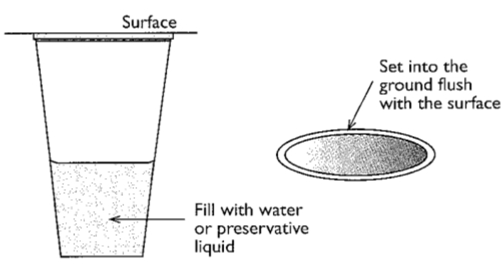
Beat net



Malaise combination trap



Pitfall trap



What types of questions could you ask about insect biodiversity in relation to trap type?

Designing an Experiment to Investigate Insect Biodiversity at Oberlin Arboretum

A. Get in jigsaw "expert" groups.
   1. Come to a consensus as a group about what is important from your assigned reading: What do other students on your research team need to know about this paper? How will you communicate it to them?
      a. Use your annotations as a starting point for discussion.
      b. Each person should have an opportunity to share their annotation (2 minutes or less).
      c. Open for discussion / Develop answers to as many of these as possible (8-10 minutes):
         - What was the topic of your paper?
         - Is it a primary or a secondary paper? How do you know?
         - Why was the research done?
         - What were the results?
         - What conclusions did the author(s) draw?
         - Did the author(s) think this research was effective at answering the research question? What is left unanswered?
         - How is this research relevant to our project goals?

B. Get in research teams.
   1. Start with a brief discussion to highlight key points from each reading (no more than 3 minutes per person).
      a. Remember, you each are experts on different papers.
      b. Impart your wisdom with a goal to inform your group with knowledge that will be important as you move into the experimental design phase.
   2. Knowing what you know from the readings and experimental design parameters provided to you by your instructor, develop an initial draft that addresses:
      a. Your overall research question
      b. An appropriate hypothesis
      c. Accompanying predictions if hypothesis IS supported vs if it is NOT
      d. Submit to instructor

Group Name:	
Group Members:	
Research Question	
Hypothesis = CLAIM	
If hypothesis is supported, what do you expect to see?	**If hypothesis is <u>not</u> supported, what do you expect to see?**